

FORMATION OF WINTER STRATUS; DEPTH OF NORTHEAST WIND.

ALEXANDRIA BAY, N. Y.,
February 20, 1917.

DEAR SIR:

(1) As you will have observed from the weather maps, the long-continued cold weather that has prevailed during the past several weeks, accompanied by snowstorms of short duration but great frequency, causing more and deeper snow than "the oldest inhabitants" can boast of, it is needless for me to write at any length on this subject; but I thought it might be of interest to say that during this wintry period the absence of any well-defined cloud form has been remarkable. I have not observed any true cirrus, cirro-cumulus, or alto-cumulus, and rarely any strato-cumulus. All cloudy periods came on by a gradual thickening of the blue sky into a milky sheet, causing the sun to shine with a pale light, and even when the snow fell in seemingly large amounts the sun could usually be seen shining feebly. On a few occasions I could trace out a cirrus streamer, but it was ill-defined and soon lost its form, taking on a uniform milky haze.

(2) I might add that the Northern Lights, which were so brilliant in the Fall, completely failed us, until a few evenings ago a faint arch appeared.

(3) The cold northeasterly winds which we get in front of advancing lows must be very [thin] sheets of air, i. e., extend to but a short distance above the earth, for on several occasions we have had rain with the temperature but a few degrees above 0°F.

Yours, very truly,

DOUGLAS MANNING.

Dr. W. R. Blair, in charge of aerological investigations, makes the following comments:

The cloud formation described in paragraph (1) above is not an unusual winter type. The thin layer of stratus begins forming at a considerable altitude and apparently thickens by continuing to form at lower and lower levels. Measurements on the height of the base of this layer, by means of kites, indicate that the interval from the time when the first cloud formation is visible (usually in a white sky) until the layer is 2 or 3 kilometers thick, amounts to but a few hours.

Our upper-air observations indicate that the cold northeasterly wind mentioned in paragraph (3) does not often exceed 1 kilometer in depth.

551.513 (82)

ATMOSPHERIC CIRCULATION AND THE WEATHER IN ARGENTINA.¹

By H. HELM CLAYTON, Chief, Department of Weather Forecasts.

[Dated: Argentine Meteorological Office, Buenos Aires.]

Argentina lies between the tropical high-pressure belt and the low-pressure belt of the Antarctic Circle. As a result of this pressure distribution and the rotation of the earth the general air movement is from the northwest. The principal seasonal change in pressure distribution is in the interior between the northern boundary and latitude 35° S., where a relatively low pressure in Summer (December to January) is replaced by a relatively high pressure in Winter (June to August), probably as a result of the heating and cooling of the continent. The seasonal change in pressure brings about a marked increase in the frequency of rain-bearing NE. to SE. winds in Summer and an increase in the drier offshore winds in Winter.

Besides the annual changes there are the well-known diurnal changes in pressure and winds. The observations show the maximum pressure central over the arid regions of western Argentina at night, and the minimum over the same region during the day. The winds at Córdoba and at Buenos Aires show clearly the influence of the daily pressure wave.

In addition to the more or less permanent arrangement of pressure and wind belts around the earth, and the annual and daily changes, there are the moving cyclones and anticyclones, of which 10 types, 4 of high pressure and 6 of low pressure, have been recognized in Argentina. The anticyclones usually appear in the southwest and move northeastward. They appear to be the result of masses of cold air which break off from the polar region and progress northward toward the equator, but at the same time they are carried eastward by the general drift of the atmosphere. When the movement of the centers is unusual, they are frequently found associated with changes in the prevailing atmospheric drift. The anticyclones show a tendency to linger about latitudes 30° to 35° S.

The movements of the cyclones are much more erratic than those of the anticyclones. In Winter and Spring they are apt to linger in the vicinity of the Paraná, which is a region of moisture and comparative warmth in Winter. In Summer the cyclones linger over the hot arid plains between Mendoza and Santiago. The movements of the cyclones seem to be controlled chiefly by two factors: (1) The upper drift, which may be determined roughly by the general trend of the sealevel isotherms, because temperature is the main factor in determining upper air pressures; and (2) the sealevel pressure over large areas, which determines the general drift of the lower air. Cyclones are frequently observed moving around large anticyclones in the same direction as the circulating wind.

The motions of the atmosphere are not all explained by daily and annual changes and the passage of cyclones. There are changes occupying days, weeks, months, or years the nature of which is not entirely clear. These changes may be analyzed into waves of different lengths of which the shorter progress more rapidly. Not only do the different waves progress with different speeds, but also in different directions; also they vary in amplitude as they progress, and waves of the same period change their direction of motion from day to day. However, it has been possible to analyze them roughly, to select predominating conditions, and to base useful forecasts on the results.

551.5 (048) (82)

THE ARGENTINE METEOROLOGICAL SERVICE.¹

[ABSTRACT by WM. G. REED.]

The establishment of the Argentine meteorological service—which was due to the initiative of Dr. B. A. Gould, founder of the astronomical observatory at Córdoba—was effected by a law approved toward the end of 1872. The central office was installed in the observatory at Córdoba, but the two institutions were entirely independent, except for having a director in common. During Gould's administration 52 stations were established, at 23 of which observations were made for more than three years; but so many of the observers lost interest that, at the time of his retirement in 1884, there were only 17 active stations, although the service was established on a permanent basis. Four volumes of observations and discussions had been published; isothermal maps had been made, the essentials of which have scarcely been altered by more recent data; and rainfall data for Argentina and surrounding regions had been collected.

¹ Abstract, by W. G. Reed, of the chapter under this title in: *Servicio meteorológico argentina, Historia y organización, con un resumen de los resultados.* Buenos Aires, 1914. pp. 146-163, and charts.

¹ República Argentina, Ministerio de Agricultura, *Servicio meteorológico argentina Historia y organización, con un resumen de los resultados.* Preparado bajo la dirección de Guatierio G. Davis, Jefe del servicio. 181p. 69pl. Buenos Aires, 1914 [in Spanish and English].

In 1885, when Walter G. Davis became director, the central office was moved from the astronomical observatory to a new building in Córdoba, and the number of instruments was increased so that all the usual meteorological studies could be made. During the following years the program of the founder was continued, the network of stations continually increased, installations improved, and stations frequently inspected.

The observations were reduced, discussed, and published as funds permitted. At the end of 1901 the observations from 47 stations, many of which included regions distant from the centers of population, had been published. At this time the Central Office was moved to Buenos Aires as the extension of telegraph lines to outlying regions had made it possible to obtain telegraphic reports of simultaneous observations from the Bolivian frontier to Santa Cruz and from the Andes to the Atlantic. At the end of 1901 the service included 11 first-class stations with automatic registers; 68 second-class stations at which observations of pressure, temperature, wind direction and force, cloudiness, and precipitation were made at 7 a. m., 2 p. m., and 9 p. m.; 9 third-class stations which differed from the second class only in not having barometers; and 240 rainfall stations. With few exceptions these stations were accessible by telegraph.

The first daily meteorological bulletin appeared on January 1, 1902, and the first daily weather map on February 21 of the same year. Up to September, 1902, the data were based on the 2 p. m. observation; but owing to delays in telegraphing, it was not possible to publish the map before midnight, and it did not reach the public until the following morning. Beginning with September, 1902, the 7 a. m. observations were used for the map until December 31, 1903. On January 1, 1904, the observation hours were changed to 8 a. m., 2 p. m., and 8 p. m.; the morning observation was used for the weather map. From July, 1904, the 8 p. m. observation of the preceding day was included in the morning telegram. The map was published in the printing establishment of the Meteorological Office, which also handled all the publications of the Ministry of Agriculture.

In September, 1904, the forecasting service began; forecasts were made for the 36-hour period ending at 8 p. m. of the following day. Forecast display flags were used at the principal Atlantic ports and the forecasts were delivered to the National Telegraph lines for transmission to the telegraph offices throughout the country. When the forecast work was inaugurated the service had, at places accessible by telegraph, 140 stations where all elements were observed and 420 rainfall stations in Argentina, as well as the observations by exchange of 5 Brazilian, 1 Uruguayan, and 1 Chilean station. In November, 1904, these data were increased by a nightly synopsis which gave the weather conditions since the morning observation. This synopsis was sent by a number of stations sufficient to give a general idea of the weather prevailing during the day; it was given to the morning papers for publication.

In the beginning of 1904 the Meteorological Office took charge of the meteorological and magnetic station established on Laurie Island in the South Orkneys by the Scottish Antarctic Expedition during the preceding summer (1902-3). This station has been continued, the observers being relieved each summer (December or January). Hourly direct meteorological readings of all the instruments are made, and automatic registers have been running since the station was established. Two complete sets of absolute magnetic observations have

been made each week and the photographic variometers are constantly in use. The only interruptions are those due to the need of repairs which could not be made with the equipment at hand.

With the station on Laurie Island, $\phi = 60^{\circ} 43' S$, the Argentine Meteorological Service has an extension in latitude of nearly 40 degrees, in which there are 42 first-class stations, 152 second-class stations, 12 third-class stations, and 1,930 rainfall stations. The 8 a. m. and 8 p. m. observations from 190 of these stations of the first, second, and third classes in Argentina and Paraguay are used in the construction of the weather map, besides the rainfall from about 1,350 stations, and, in exchange for Argentina data, the general observations made at 8 a. m. from 6 stations in Uruguay, 10 in Brazil, and 26 in Chile.

The Hydrometric Section was established in July, 1902, to study the stream flow and water resources of Argentina, and to provide for flood warnings. Daily gage readings have been made of the more important rivers and the hydrography of many possible dam sites has been more or less completely studied. Reports have been made on the topography of certain drainage basins and irrigation projects. The possibilities of utilizing river water, especially for irrigation, and those of hydroelectric power development have been partially examined. In 1912 the section began the measurement of ground water levels. In June, 1913, the publication of a synopsis and forecast of river stages was commenced in the daily weather map. Discharge curves have been calculated for many of the rivers.

The Magnetic Section was established in 1904 at Pilar in the Province of Córdoba. Magnetic observations had been made from time to time in Argentina since early in the 19th century. Systematic work began at Pilar when the Meteorological Office took over the station in the South Orkneys. Field operations in various parts of the country were carried out in 1904, and again in 1908 and 1912-1913, when the same stations were occupied to determine the rate of secular change.

551.501 (794)

REPORT OF THE METEOROLOGICAL STATION AT BERKELEY, CAL., FOR THE YEAR ENDING JUNE 30, 1915.¹

By WILLIAM GARDNER REED.

[Author's abstract, submitted Mar. 12, 1917.]

The work of the Meteorological Station maintained by the University of California was carried on by the Department of Geography during the year ending June 30, 1915. A complete statement of the history of the station and of the instruments and exposures was published in the reports for the years ending June 30, 1913,² and June 30, 1914.³

Pressure.—Pressure was measured twice daily, at 8^h and 20^h, mean civil time of the 120th meridian west from Greenwich (16^h and 4^h Greenwich mean civil time, or 8 a. m. and 8 p. m., Pacific Standard Time, the time in local use). The barometer in use is a Fortin cistern mercurial instrument of the United States Weather Bureau pattern. Although pressure relations are doubtless of great importance as showing the character of the seasons in California, unfortunately no correlations have been made between monthly pressures and other meteorological conditions at

¹ Univ. Cal., Publ. geogr., Berkeley, Feb. 28, 1917, 1: 441-504.

² Abstract in MONTHLY WEATHER REVIEW, Mar. 1914, 42: 164-166.

³ Abstract in MONTHLY WEATHER REVIEW, Apr. 1916, 44: 202-204.